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ABSTRACT

Twenty good spellers and 20 poor spellers at each grade level from two to five participated in a study of morphological and orthographic spelling pattern abstraction. Subjects completed a multiple choice test of nonsense words, a multiple choice test of real words, and a dictation test of nonsense words. Both groups showed developmental trends in pattern abstraction on all tests. Good spellers were about two years ahead of poor spellers in pattern acquisition. On the nonsense-words tests, good spellers performed better on orthographic than on morphological patterns, while the reverse was true for poor spellers. The findings were interpreted as indicating that pattern abstraction occurs as part of spelling acquisition. (Author/AA)

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A Developmental Study of Children's Ability to Abstract Spelling Patterns

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Abstract

Morphological and orthographic spelling pattern abstraction was studied by administering multiple-choice tests, one of nonsense words, one of real words and a dictation test of nonsense words to 20 Good and 20 Poor Spellers at each grade from two to five. Both groups showed developmental trends in pattern abstraction on all tests. Good Spellers were about two years ahead of Poor Spellers in pattern acquisition. On the nonsense word tests Good Spellers performed better on orthographic than on morphological patterns while the reverse was true for Poor Spellers. The findings demonstrate that pattern abstraction occurs as part of spelling acquisition.

Little is known about how we learn to spell, i.e. to encode spoken language into standard written form. It seems unlikely that the process simply involves memorizing the sequence of letters in words or storing a series of visual images or templates. The fact that children can spell nonsense words and words that they have never seen before would suggest knowledge of some system of rules. Since many of these rules are not formally taught, learning to spell must at least in part involve the abstraction of a set of rules that characterize the spelling system.

Linguists, psychologists and educators have focused on the reading rather than the spelling process. Venezky (Calfee, Venezky & Chapman, 1967), Gibson (1970), and others have concluded that pattern abstraction is an integral part of learning to read. It seems logical to assume that pattern abstraction might also be operating in the acquisition of spelling, in which case children identified as good spellers should show greater mastery of spelling patterns than poor spellers. A thorough review of the literature revealed no previous developmental study of pattern abstraction in the spelling process.

The relationship between spoken and written English cannot simply be explained in terms of sounds being represented by letters or graphemes corresponding to phonemes. However, a thorough linguistic analysis of spelling-to-sound correspondence carried out by Venezky (1967) indicated that,

though complex, there is a considerable degree of regularity and order in the relationship. Venezky analyzed the correspondence from the point of view of reading, taking both phonological and morphological factors into account. He then developed a model for mapping from spelling into sound and explaining the general patterns of the orthography. Venezky cautioned that the correspondences for the spelling process (sound-to-spelling) are not a simple reversal of those postulated for the reading process (spelling-to-sound).

Studies of the spelling process, such as the one carried out by Hanna (1966), have investigated the more superficial phoneme-grapheme correspondences based solely on phonological considerations and ignoring morphological factors. There are no systematic linguistic studies investigating different types of patterning in the orthography from the point of view of spelling.

The present research was aimed at studying the ability of children to abstract and encode certain word features in spelling. The study attempted to answer the following questions:

1. Do children in fact abstract and use patterns in the spelling process?
2. Is there a developmental change in their ability to do so.
3. Is the ability to abstract patterns a factor in spelling ability?

Method

Tests. Three tests were designed to study the acquisition of two types of patterns: orthographic patterns which relate to the written system without direct regard to sound, i.e. the alternation of single and double consonants to indicate the quality of the preceding vowel (coma vs comma), and morphological patterns which relate to the way certain morphological considerations such as plural and past tense are encoded. Test 1, a multiple-choice test of nonsense words using 30 sub-patterns (17 orthographic, 13 morphological); Test 2, a multiple-choice test of real words exemplifying the same sub-patterns used in Test 1; and Test 3, a dictation test of nonsense words (different from those used in Test 1), using the same sub-patterns tested in Tests 1 and 2. The multiple-choice items involve 3 choices. More complete details concerning the construction of these tests are given in Schwartz (1975). Knowledge of these patterns was assumed to be demonstrated by the ability of children to spell nonsense words exemplifying the patterns, since correct spelling of these unfamiliar words could not have been accomplished through memorization.

Subjects. At each grade level from two to five, approximately 60 children of average intelligence and academic achievement, with no indication of specific learning disability, were administered the Spelling subtest of the Durrell Analysis of Reading Difficulty. At each grade level,

the top 20 were designated as Good Spellers and the bottom 20 as Poor Spellers, giving a total number of 160 subjects.

Design. The experimental plan was a mixed model, 4x2x2 factorial design with repeated measures on the last factor (Winer 1962, pp. 155, 337). The independent variables were Grade (2, 3, 4 and 5), Spelling Ability (Good and Poor), and Spelling Patterns (Orthographic and Morphological). Subjects were nested in Grade and Spelling Ability.

Procedure. Subjects at each grade level were tested as a group in their own classroom. Each of the tests was administered separately. The three tests were always presented in the order Test 1, Test 2 and Test 3 with a minimum lapse of two hours between tests. For each item the examiner said the word, then a carrier phrase containing the word and then repeated the word.

Results. An analysis of variance was carried out on each test. On Tests 1 and 3 Grade 2 Poor Spellers displayed little if any knowledge of Spelling Patterns, and on Test 2 the Grade 2 Poor Spellers performed only just above chance level. The Grade 2 Good Spellers performed as well or nearly as well as the Grade 4 Poor Spellers on all of the tests. Scores improved with grade level and Good Spellers were consistently better than the Poor Spellers. There were highly significant main effects for Grade and Spelling Ability ($p < .001$). The Spelling Pattern effect was significant only in the test using real words, Test 2. Here scores on orthographic patterns were higher than those on morphological patterns. There was

an interaction of Grade and Spelling Ability on Tests 2 and 3, where the difference between the Good and Poor Spellers diminished with grade level. This trend was also present in Test 1 but it was not significant. On the two tests using nonsense words, Tests 1 and 3, there was an interaction of Spelling Ability and Spelling Patterns and an interaction of Grade, Spelling Ability and Spelling Patterns. Poor Spellers tended to find morphological patterns easier than orthographic patterns, while the reverse was true for the Good Spellers. These trends were not perfectly consistent over grades.

Calculation of a more conservative procedure, Quasi-F ratios, recommended by Clark (1973) showed significant main effects only for Spelling Ability and Grade on all three tests. The Spelling Pattern effect in Test 2 and all of the interactions were no longer significant, so that any conclusions regarding differences between Spelling Patterns must be restricted to the particular items that were used.

To further investigate the relationship between pattern abstraction and the ability to spell real words, Product-moment Correlations were carried out using IQ scores, Durrell Spelling Test scores and scores on the three experimental tests and sub-pattern scores at each grade level. The Durrell Spelling Test scores correlated significantly ($p < .01$) with scores on all three tests. The correlations in Grades 2 and 3 were higher than those in Grades 4 and 5, and the highest correlation for all grades was with Test 3,

the dictation test. Intercorrelation among the experimental tests were all relatively high ($p < .01$). The Durrell Spelling Test correlated significantly ($p < .01$) with each of the two test patterns at each grade level on all tests. For Tests 1 and 3 the correlation was higher with orthographic patterns than with morphological patterns.

Each spelling sub-pattern was examined, 1) for its ability to discriminate between Good and Poor Spellers at each grade level; and 2) the grade level at which it was mastered by Good Spellers and by Poor Spellers. On all of the tests a higher percentage of orthographic patterns than morphological sub-patterns discriminated between the two groups of spellers. This is in keeping with the general finding that orthographic patterns were more difficult for the Poor Spellers and would therefore be more likely to discriminate between groups. As expected from the significant Spelling Ability effect on the analyses of variance, Good Spellers began earlier and in general tended to be in advance of the Poor Spellers in pattern mastery on all of the items. On all three tests the groups differed more on their mastery of orthographic patterns than morphological patterns.

Discussion and Conclusions

The results permit clear affirmative answers to the three questions posed earlier and clearly demonstrate that spelling acquisition involves more than the rote memorization of each word. The child's ability to spell, for instance a plural nonsense word like "ruds", indicates that he has rules of extension that enable him to deal with new instances.

Young good spellers, early in Grade 2, before the beginning of formal spelling instruction had already begun to abstract both types of patterns. Good spellers showed orderly developmental trends for both types of patterns on all of the tests. Poor spellers lagged behind the good spellers in pattern acquisition by about two years but also showed orderly developmental trends.

For the items used, a greater facility for orthographic pattern abstraction seemed to occur in the more advanced stages of spelling acquisition as shown by 1) the interaction of Spelling Ability and Spelling Patterns on the two tests using nonsense words; 2) the fact that a higher percentage of orthographic items than morphological items discriminated between Good and Poor Spellers; and 3) the higher correlation of the Durrell Spelling Test with orthographic patterns than with morphological patterns.

The similarity in trends for both Tests 1 and 3 and the high correlation between them would indicate that the main effects and interactions observed for Test 1 are not an artifact of multiple-choice, nor an artifact of the particular set of nonsense words chosen. Likewise the similarity in trends for Spelling Ability and Grade on all three tests, plus the relatively high intercorrelations between the tests would suggest that the subjects used pattern abstraction rather than rote memory alone in spelling the familiar words in Test 2. Spelling can thus be considered as belonging to the larger linguistic community of rule-governed behavior along with spoken language and reading skills, which are acquired through the abstraction of general principles and patterns.

This is the first study investigating the acquisition of spelling patterns. It has been demonstrated that spelling ability is associated with an orderly acquisition of morphological and orthographic patterns, supporting the notion that an important aspect of spelling behavior is rule-governed. A more complete investigation of the acquisition of spelling patterns awaits a thorough linguistic description and analysis of English orthography in relation to the spelling process. Further research is also needed to develop a general theory of literacy which puts both the process of learning to read and the process of learning to spell in proper perspective.